EPA Region 7 TMDL Review

TMDL ID	295	*Water Body ID*	7236
Water Body Name	McDaniel Lake		
Pollutant	Nutrients (Algae)		
Tributary			
State	MO *HUC*	10290106	
Basin	Upper Little Sac		
Submittal Date	12/30/2003		
Approved	Yes		

Submittal Letter

State submittal letter indicates final TMDL(s) for specific pollutant(s)/ water(s) were adopted by the state, and submitted to EPA for approval under section 303(d) of the Clean Water Act.

Submittal letter received on December 31, 2003.

Water Quality Standards Attainment

The water body's loading capacity for the applicable pollutant is identified and the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources is described. TMDL and associated allocations are set at levels adequate to result in attainment of applicable water quality standards.

The impairment of McDaniel Lake is due to cyanobacteria blooms and the metabolites released from these algae as the cells die-off, causing taste and odor problems in the drinking water supply. This lake is protected under Missouri's Tier II Anti-degradation policy as a high quality water, which requires that existing water quality be maintained or improved, unless a showing is made that lowering water quality is necessary for economic and social development. The drinking water impairment is based on exceedance of the general narrative criteria found in Missouri's water quality standards (WQS), and in the specific criteria of the WQS which states (in part): "For those streams or lakes designated for drinking water supply use, the taste- and odor-producing substances shall be limited to concentrations that will not interfere with the production of potable water by reasonable treatment processes."

There is an extensive database existing for this lake, established over many years; limnological analyses has indicated the loading capacity identified in the TMDL, and associated allocations should result in WQS attainment.

Numeric Target(s)

Submittal describes applicable water quality standards, including beneficial uses, applicable numeric and/or narrative criteria. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, site specific if possible, was developed from a narrative criterion and a description of the process used to derive the target is included in the submittal.

All applicable WQS, benefical uses and narrative criteria are described. A numeric expression of the narrative criteria is described and was derived using a subset of Missouri reference lakes compiled by University of Missouri limnologists for MDNR and EPA.

Link Between Numeric Target(s) and Pollutant(s) of concern

An explanation and analytical basis for expressing the TMDL through surrogate measures (e.g., parameters such as percent fines and turbidity for sediment impairments, or chlorophyll-a and phosphorus loadings for excess algae) is provided, if applicable. For each identified pollutant, the submittal describes analytical basis for conclusions, allocations and margin of safety that do not exceed the load capacity.

The TMDL endpoint discussion provides several examples of endpoint options; use of a reference lake approach for Missouri for deriving the endpoint target makes sense given the relatively low levels of nutrients currently existing in the lake and the essence of the impairment - taste and odor. The reference condition approach yields a chlorophyll-a target of 9.7 for McDaniel Lake, however, citing John Downing (et al. 2001), the target was adjusted to not exceed 10 ug/L near the dam of the lake since this value has been shown in the literature to reduce the risk of cyanobacterial proliferations. Linear regression using state-wide lake data and taking into account a lower 95th percentile confidence interval provides a target in-lake total phosphorus concentration of 26.68 ug/L.

Source Analysis

Important assumptions made in developing the TMDL, such as assumed distribution of land use in the watershed, population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources, are described. Point, non point and background sources of pollutants of concern are described, including magnitude and location of the sources. Submittal demonstrates all significant sources have been considered.

Major causes of the eutrophication of the lake over the years have been increased nutrient loading from agricultural sources, urban stormwater runoff from lawns and septic tanks, improper treatment of wastewater, and increased concentration of nutrients in a decreased water volume as a result of increased demand for water, and drought. Several non-point source projects have been implemented in the watershed over the years, and along with agricultural economics and demographics, the lake water has dramatically improved. However, nutrient levels in the sediments of the mudflats of the lake remain a real concern in regards to cyanobacteria bloom potential. There are five point sources in the watershed, however, the total design flow for the applicable facilities is less than one-tenth of one percent of the total watershed flow. Therefore, these facilities are not given an allocation but will initiate a total phosphorus monitoring program as appropriate. All

significant sources have been considered.

Allocation

Submittal identifies appropriate wasteload allocations for point, and load allocations for nonpoint sources. If no point sources are present the wasteload allocation is zero. If no nonpoint sources are present, the load allocation is zero.

Given an approximate existing condition of 3.36 pounds/day total phosphorus loading to the lake, a 40% reduction in total phosphorus is necessary to meet the load capacity of 2.06 pounds/day.

WLA Comment

The WLA is zero.

LA Comment

The LA is 2.01 pounds/day total phosphorus.

Margin of Safety

Submittal describes explicit and/or implicit margin of safety for each pollutant. If the MOS is implicit, the conservative assumptions in the analysis for the MOS are described. If the MOS is explicit, the loadings set aside for the MOS are identified and a rationale for selecting the value for the MOS is provided.

The MOS is both implicit and explicit; it is implicit because regression analyses provided a more conservative target (about 50% lower) than using a simple average value of state-wide data. The MOS is also explicit by matching the lower 95th percentile confidence interval of total phosphorus concentration with the in-lake chl-a target concentration of 10 ug/L, which accounts for an allocation of 2.4% of the total load , or 0.048 pounds/day.

Seasonal Variation and Critical Conditions

Submittal describes the method for accounting for seasonal variation and critical conditions in the TMDL(s).

Seasonal variation and critical conditions are accounted for by deriving the target using that data collected during those times of the year when taste and odor problems occur (July through September). However, the 10 ug/L chl-a target applies year-round.

Public Participation

Submital describes public notice and public comment opportunity, and explains how the public comments were considered in the final TMDL(s).

Public meetings, including a TMDL presentation, were held July 24th, 2003, for the public and on August 1, 2003 for the Watershed Committee of the Ozarks. A 30-day Public Notice was held from November 21 to December 21, 2003.

Monitoring Plan for TMDL(s) Under Phased Approach

The TMDL identifies the monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of WQS, and a schedule for considering revisions to the TMDL(s) (where phased approach is used).

Current monitoring efforts are comprehensive and frequent, compared to most lake sampling programs, and are conducted by the City of Springfield Utilities. Current monitoring efforts are to be enhanced in this Phase 1 of this TMDL such that enough data will be collected in order to accurately as possible simulate this lake system using a lake model.

Reasonable assurance

Reasonable assurance only applies when reduction in nonpoint source loading is required to meet the prescribed waste load allocations.

Although not required for this TMDL, reasonable assurances include the potential for more forceful attempts to take place to require periodic inspection and maintenance of on-site septic systems, aggressive ordinances and policies related to the installation of new on-site septic systems, and staff expertize with the City Utilities of Springfield to conduct monitoring, analyze samples, and accomplish water quality improvement projects. The watershed has a very active Water Quality Planning Group as well, which MO foresees coordinating with Springfield Utilities efforts.